higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

DATA COMMUNICATION AND NETWORKING
NQF LEVEL 4

10 November 2022

This marking guideline consists of 7 pages.

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SECTION A

QUESTION 1

1.1 B
1.2 A
1.3 D
1.4 C
1.5 D
1.6 A
1.7 C
1.8 C
1.9 B
1.10 C

(10 × 1) **[10]**

QUESTION 2

2.1 D
2.2 F
2.3 K
2.4 L
2.5 B
2.6 I
2.7 C
2.8 J
2.9 A
2.10 E

(10 × 1) **[10]**

TOTAL SECTION A: 20

SECTION B

QUESTION 3

3.1 3.1.1

- Switch - connects devices in a LAN network.✓
- Firewall – permits or denies network traffic based on policy. ✓OR protects a LAN from externa threats. ✓
- Wireless router – used for routing. ✓ OR used to connect a network to the internet. ✓ OR used to separate networks. ✓
- Server – is used to store resources. ✓ OR a computer that provides information and services to clients. ✓

(4)

3.1.2 A firewall is a security device or software that is used to protect or secure✓ networks whereas a switch is used to connect devices in a LAN. A firewall filters incoming and outgoing traffic based on organizational security. ✓ (2)

3.2

- Simplex:✓ Communication is unidirectional. Only one of the two devices on a link can transmit, the other can only receive. The simplex mode can use the entire capacity of the channel to send data in one direction.✓
- Half-duplex:✓ Each station can both transmit and receive, but not at the same time. When one device is sending, the other can only receive✓ and vice versa.
- Full-duplex✓ Both stations can transmit and receive simultaneously. In full duplex mode, signals going in one direction share the capacity of the link with signals going in another direction.✓ (3 × 2) (6)

[12]

QUESTION 4

4.1 A virtual LAN (VLAN) allows one to separate users✓ into separate broadcast domains.✓ VLANs improve security, segmentation and flexibility. Each VLAN on a switch behaves as if it is a separate physical bridge.✓ The switch forwards packets only to ports assigned to the same VLAN.✓ This reduces network traffic.✓ VLANs require a trunk to span multiple switches. Each trunk can carry traffic for multiple VLANs.✓ (Any 4 × 1) (4)

4.2 User-acceptance testing (UAT)✓ is one of the last stages of the software development life cycle. It is sometimes known as end-user testing.✓ As the name suggests, UAT is conducted on a product by the end users of the product for approval for production release.✓ (Any 2 × 1) (2)

4.3 4.3.1 A – Open systems interconnection (OSI)
B – Transmission control protocol/Internet protocol OR TCP/IP (2)

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4.3.2

OSI (Open System Interconnection)	TCP/IP (Transmission control protocol/ Internet protocol)
• It is a generic, protocol-independent standard, acting as a communication gateway between the network and end user.	• It is based on standard protocols around which the Internet has developed. It is a suite of protocols. That is, a box of protocols.
• The transport layer maps directly to the transport layer of the TCP/IP	• The transport layer maps directly to the OSI transport layer.
• It follows a vertical approach.	• It follows a horizontal approach.
• It has a separate presentation layer and a session layer.	• It does not have a separate presentation layer and session layer.
• The application layer specifies functions of applications. That is, it offers specifications for user interface.	• The TCP/IP application layer includes a number of protocols that provide specific functionality to a variety of end user applications.
• The network layer specifies routing and logical addressing functions.	• The network layer becomes the internet layer.
• It is a reference model around which networks are built. Generally it is used as a guidance tool.	• It is in a way the implementation of the OSI model.
• The physical and data link layers are separate layers.	• OSI layers 1 and 2, the physical and data link layers maps to the TCP/IP network access layer.
• The OSI model Layers 5, 6, and 7 are used as references for application software developers and vendors to produce products that operate on networks.	• Generally, application developers must incorporate the functions of layer 5 and 6 in their applications.
• It defines services, interfaces and protocols very clearly and makes clear distinction between them. It is protocol independent.	• Services, interfaces and protocols are not clearly separated. It is also protocol dependent.
• It has seven layers.	• It has four layers.

Accept answers in the form of a paragraph.
✓ for each clearly defined characteristic of each model
(Any 8 × 1) (8)
[16]

QUESTION 5

5.1 Cable A – Single-mode fibre optic cable
Cable B – Multimode fibre optic cable
(Answer must contain the words 'fibre optic')(2 × 2) (4)

5.2
- The cable allows multiple beams of light to pass through.
- It has a larger core.
- This cable is used in shorter distances compared to single mode.
- It uses an LED as the light source.
- It has greater dispersion. That is, greater scattering of beams of light
- Mostly used in LANS. (Any 4 × 1) (4)

5.3 Network security consists of three different controls namely physical network security✓ which is designed to prevent unauthorized personnel from gaining physical✓ access to network components such as routers, cabling cupboards and so on. Controlled access, such as locks, biometric authentication and other devices should be used✓; technical network security✓ which protect data that is stored on the network or which is in transit across, into or out of the network. ✓ And administrative network security✓ which consist of security policies and processes✓ that control user behaviour, including how users are authorized and authenticated and also restricts the data that each user can access.✓
(Any 6 × 1) (6)
[14]

QUESTION 6

6.1
- Local user profile: Created the first time that a user logs on to a computer. The local user profile is stored on a computer's local hard disk. Any changes made to the local user profile are specific to the computer on which the changes are made.
- Roaming user profile: A copy of the local profile is copied to and stored on a server share. This profile is downloaded every time that a user logs on to any computer on the network and any changes made to a roaming user profile are synchronised with the server copy upon logoff.
- Mandatory user profile: A type of profile that administrators can use to specify particular settings for users. Only system administrators can make changes to mandatory user profiles. Changes made by the user to desktop settings are lost when the user logs off.
- Temporary user profile: A temporary profile is issued any time that an error condition prevents the user's profile from being loaded. Temporary profiles are deleted at the end of each session and changes made by the user to their desktop settings and files are lost when the user logs off. (Any 3 × 2) (6)

6.2 Access control is a method of limiting access to a system or to physical or virtual resources.✓ It is a process by which users can access and are granted certain rights/privileges to systems, resources or information.✓ Access control is a security technique that has control over who can view different aspects, what can be viewed and who can use resources in a computing (4)

environment.✓ It is a fundamental concept in security that reduces risk to the business or organisation.✓

6.3 A utility program is system software✓ that helps users to analyse, configure, monitor or help maintain their computers.✓ (2)

6.4 It must provide connections✓, communications and services. ✓ (2)

6.5 A print queue is a list of printer output jobs✓ held in a reserved memory area.✓ It maintains the most current status✓ of all active and pending print jobs.✓ (4)

[18]

QUESTION 7

7.1 Network capacity planning is the process of planning✓ a network for utilisation, bandwidth, operations, availability and other network capacity constraints.✓ It is a type of network or IT management process✓ that assists network administrators in planning for network infrastructure and operations in line with current and future operations.✓ (4)

7.2
- Data transmission rate.
- How much is the network used.
- The number of lost or erroneous packets. (3 × 2) (6)

7.3 Packet switching breaks data messages into packets, which are sent at the same time across available circuits between the source and destination device.✓ Packet switching does not set up a circuit between communication devices.✓ (2)

7.4 7.4.1 To prevent a user gaining access to systems or data using an authorised user's account, implement two-factor authentication.✓ This requires a user to provide a second piece of identifying information in addition to a password.✓ Install a firewall. ✓

OR

Encrypt sensitive corporate data at rest or as it travels over a network using suitable software or hardware technology.✓ That way, attackers will not be able to access confidential data.✓

7.4.2 To detect and prevent insider threats, implement spyware scanning programs, antivirus programs, firewalls and a rigorous data backup and archiving routine.✓ You can also train employees and contractors on security awareness before allowing them to access the corporate network.✓

OR

Implement employee monitoring software✓ to reduce the risk of data breaches and the theft of intellectual property by identifying careless, disgruntled or malicious insiders. ✓

7.4.3 Defend against phishing attacks starts by educating users to identify phishing messages.✓ In addition, a gateway email filter can trap many mass-targeted phishing emails and reduce the number of phishing emails that reach users' inboxes.✓

(3 × 2) (6)

7.5 Wide area network (2)
[20]

TOTAL SECTION B: 80
GRAND TOTAL: 100

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